

Mattioli S, Baldasseroni A, et al. Risk factors for operated carpal tunnel syndrome: a multicenter population-based case-control study. BMC Public Health 2009;9:343

Design: Case-control study

Summary of pertinent results:

- 220 cases of surgically treated CTS (184 women, 36 men, mean age 48) and 356 controls (286 women, 70 men, mean age 49) were identified from national health service records at 13 local administrative regions in northern Italy; all subjects were under 65 years of age
- Carpal tunnel release codes from hospital discharge records were used to identify cases; Italian regulations require that all carpal tunnel release operations be done on hospital premises, and most operations are preceded by nerve conduction studies
- Controls were identified from national health registries, in which all residents in Italy are entitled to membership; sex and age group frequency matching was used (but not individual case matching)
- Questionnaires were mailed to all potential subjects, seeking demographic, medical, occupational, and biomechanical factors
- Biomechanical factors were yes/no responses to whether jobs entailed hand-held vibratory tools, sustained forceful hand/wrist movements, frequent repetitive hand/wrist movements, frequent movements in uncomfortable hand postures, frequent pinching actions, and manual work provoking skin compression
- Job-specific plausibility of self-reported biomechanical factors was reviewed by three occupational medicine physicians with expertise in ergonomics, using job title, task descriptions, age, gender, employment duration, and historical context; these physicians were blinded to case/control status of the subjects
- This ergonomic review resulted in extensive reclassification of the self-reported exposure categories: 250 participants (114 cases, 136 controls) had one or more exposures reclassified as "unexposed;" 18 participants (9 cases, 9 controls) had at least one factor reclassified from "unexposed" to "exposed," and 4 participants had factors reclassified in both directions
- Some non-occupational factors were associated with increased odds ratios for CTS: BMI>30 (OR=3.3), sibling with CTS (OR=6.6), rheumatoid arthritis (OR=2.2), diabetes (OR=2.6), and trigger finger (OR=2.7)
- Job titles were coded using the European Union version of the International Standard Classification of Occupations (ISCO-88) in a blinded fashion by the same physicians who classified the biomechanical exposure information
- Compared to white collar workers, blue collar workers had elevated odds ratios for CTS (OR=7.1) in a multivariable model that adjusted for BMI, family history, alcohol, trigger finger, diabetes, age, and gender
- Compared to white collar workers without biomechanical risk factors, blue collar workers with at least 1 plausible risk factor had a CTS odds ratio of 12.8

- Compared to workers with no risk factors, having a combination of risk factors that included at least 3 of 4 key risk factors (force, frequency, posture, and compression) had an odds ratio of 14.9

Authors' conclusions:

- Biomechanical exposures are relevant to the development of surgically treated CTS in both sexes and all age groups
- Some job titles were sparsely represented in the study population; for example, intensive keyboard users such as data entry workers were rare in the area under study, and this may account for some of the elevated odds ratios for blue collar workers compared to white collar
- Because the biomechanical data was collected as binary (yes/no), it cannot be assumed that subjects classified as not having risk factors were truly unexposed

Comments:

- There is an advantage to having a case-control study conducted in a setting of a national health care system, since the selection of controls is likely to arise from the cohort which gave rise to the cases
- Because the cases were treated surgically during a defined time period, they can be assumed to be mostly incident cases; this, in contrast to the prevalent cases in a cross-sectional study, means that the risk factors are likely to represent disease occurrence more than disease survival, and this is useful in studies of causality
- Presumably, the designations of blue and white collar arise from the ISCO-88 which was the source of the job titles in the study; this document is not available online
- Because the outcome of interest (operated CTS) was common in the study population (about 1/3 of the subjects were cases), the exposure odds ratios are likely to inflate the relative risks of CTS occurrence (an odds ratio of 14.9 is likely to represent a relative risk less than 14.9)
- The reclassification of risk factors by the ergonomically trained occupational medicine physicians was considerable: reclassification from "exposed" to "unexposed" for at least 1 risk factor was done in 52% of the cases and in 38% of the controls
- Because the reclassification was done blinded to case/control status, and because more cases than controls were reclassified from exposed to unexposed, this is expected to attenuate some exposure bias that might occur if cases report more exposure than controls
- The binary classification of exposure precludes estimating hours per day of exposure needed to increase CTS risk
- However, there is an increased risk with increased combinations of risk factors, which may remain valid even though the quantity of exposure is not reported

Assessment: Adequate for evidence that a combination of force, frequency, and uncomfortable posture is associated with an increased risk of CTS